REMARKS

Claims 30 and 38 have been amended to correct apparent typographical errors. No change in scope is intended. Applicants submit that these amendments obviate the rejections under 35 USC 112, second paragraph, contained in the Office Action.

New claims 43 and 44 have been added. Support for claim 43, which specifies that the aluminophosphate used in the film according to the claim contains Al-O-Al bonds as specified in the original specification at Paragraph [0103]. Claim 44 specifically identifies the aluminophosphate film as "halide free" as indicated at Paragraph [0011] and confirmed by the Examples. No new matter has been added.

In the present Office Action, claims 23-42 were rejected as obvious over Birchall U.S. Patent 3,839,078 (Birchall '078) under 35 USC 103(a).

The Office Action asserts that Birchall discloses "glass-like" (which the Office asserts is "predominantly amorphous") aluminophosphate films and that such films are "crack free" (which the Office asserts is "hermetic"). The Office Action effectively asserts that the Birchall material is the same as Applicants' material and thus the claims now presented are obvious over Birchall '078.

Applicants submit that the aluminophosphate film identified in Applicants' claims has distinct properties from those inherent in Birchall materials. Applicant submits that Birchall's materials cannot be described as "hermetic" as that term is used with respect to Applicants' materials. Specifically, the term "hermetic" was used to describe a property of being substantially non-porous in paragraph 0007, 0042, 0046 and 0051 of the specification. For example, in paragraph [0046], Applicants state that Applicants' films "form a hermetically sealing layer which prevents or drastically reduces, respectively, the access of oxygen to the metallic surface and secures an excellent protection against corrosion even at elevated temperatures."

With these criteria in mind, Applicants tested their coated metal against a metal coated with a Birchall material and an uncoated sample. The results of these tests are presented in the accompanying Declaration of Dr. Vikram S. Kaul.

As stated in this Declaration, a series of tests were performed to compare metal (304 Stainless Steel) coated with materials described in the instant

application and coated as described by Birchall. A control test was performed in which an uncoated metal coupon was used. In these tests, the three coupons were heated to 1000 °C for ten hours. The results obtained showed that the surface of the uncoated stainless steel coupon oxidized and portions of the oxidized surface spalled off. Substantially all of the Birchall coating failed and the coating together with oxidized surface spalled off the test coupon. However, the surface of the coupon in accordance with the instant claimed invention was intact and no significant spalling was observed. This set of tests clearly demonstrates a fundamental difference between a Birchall coated metal and a metal coated composite as described and claimed by Applicants.

Applicants submit that clear evidence has been provided that their aluminophosphate coating is substantially different from the material disclosed by Birchall. For example, when tested at elevated temperature, the Birchall material substantially spalled off the metal surface while Applicants' coating on metal did not. Clearly, the Birchall coating cannot be described as "hermetic" as that term is used by Applicants.

Although mere elemental analysis could classify both Applicants' and Birchall's materials as "aluminophosphates", there should be no expectation that the actual properties of a completely-formed coating should be similar based on the differences in preparation. Applicants films typically are formed from a precursor alcohol solution of an aluminum salt such aluminum nitrate and phosphorus pentoxide, which is typically cured at a high temperature such as above 300 °C. In contrast, Birchall's material is formed from a particular aluminum halide phosphate complex (Birchall col. 5, lines 13-21) at low temperatures (i.e. 80 to 180 °C, Birchall col. 4, lines 27-32).

Although Birchall asserts that on heating at low temperature, the complex decomposes with evolution of hydrogen halide and ROH and a "hard abrasion-resistant aluminum phosphate" is formed, Applicants have shown that this material when used as a coating on metal is not "hermetic" in that it does not prevent or drastically reduce access of oxygen to the metallic surface and does not secure protection against corrosion at elevated temperatures.

Further, as the Office Action points out, Birchall teaches a need for a crystallization suppressant (col. 9, lines 39-47), which Applicants' coating does

not require to create an amorphous coating layer. Applicants note that Birchall only describes a crystallization suppressant and does not specifically teach that crystallization does not occur. Applicants point to a companion Birchall document, Birchall et al. US Patent 3,870,737 corresponding to GB 1322722 (Birchall '737), which apparently also describes the aluminum phosphates formed from decomposing a aluminum halide phosphate complex as described in Birchall '078 cited in the Office Action. Table IX of Birchall '737 shows that although some components may be added to the Birchall aluminum halide phosphate complex, some crystallinity remains especially at higher temperatures in resulting Birchall aluminum phosphate fibers. Further, Birchall '737 teaches away from Applicants invention in that Birchall states that " [s]urprisingly, crystal forms of aluminum phosphate can be obtained at low temperatures which are normally obtained only by heating aluminum phosphate to temperatures in excess of 800 C" (col. 4, lines 32-35). Also Birchall states that "[t]he coating may be further heated to polymerize the deposit or to change the crystal form of aluminum phosphate" (col. 6, lines 34-36). Thus, Birchall materials could not be described as "substantially amorphous" as that term is used to describe Applicants' materials.

With respect to claims other than independent claim 23, Applicants submit that Birchall does not describe or suggest subject matter claimed. For example, claims 26 and 41 refer to a curing temperature of 300 °C for Applicants' coating material, which differentiates Applicants' material from the Birchall material. Applicants now have demonstrated a real difference in the properties between the claimed coated products, and these claims point to a distinction between Applicants' material and the cited art. Applicants submit that they have demonstrated non-obviousness with respect to these claims.

Applicants submit that claim 36 describes properties not present in the cited Birchall materials. Specifically, there is teaching that the Birchall material is wetted by molten aluminum (see Birchall '737, col. 8, lines 1-5; col. 18, lines 45-51), in contrast to the invention described in Applicants' claim 36.

Applicants further submit that Birchall materials would not show incorporation of [—PO_4–AlO_4–AlO_6–AlO_4–PO_4—] fragments or Al-O-Al bonds due to the composition of the Birchall starting material (claims 27, 38 et seq., and

43 et seq.). Thus, claims including those limitations patentably distinguish Applicants' claims from Birchall. Further, Birchall does not describe a composition containing nanoparticles as are described in Applicants' claims 28, 29, 39, and 40.

Further, a clear difference is that the cited Birchall patent does not teach a curing temperature of above 300 °C. Thus, new claim 44 is patentably distinct over the cited Birchall document.

Applicants submit that all claims now presented are in condition for allowance, and respectfully request reconsideration of the rejections made in the Office Action.

Respectfully submitted,

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